

Appin No. 10/736,751
Amendment dated November 2, 2005
Response to Office action of May 2, 2005

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Amendments to the Specification:

Please replace paragraph [0001] with the following amended paragraph:

[0001] This application is a continuation application of United States Patent Application Serial No. 09/743,222, filed under 35 U.S.C. § 371(c) in the USPTO on April 11, 2001 ~~July 12, 1999~~, issued as United States Patent No. 6,704,140 on March 9, 2004, which application is a 371 (national stage entry) of international patent application No. PCT/CA99/00626 filed on July 12, 1999 and published under WO 00/03283 on January 20, 2000, which application claims foreign priority from Canadian Patent Application No. 2,243,090 filed July 10, 1998. All of these applications are incorporated herein by reference.

Please replace paragraph [00015.2] with the following amended paragraph:

[00015.2] In preferred embodiments, the braces are mounted on either side of ~~to the sides of the C-shaped frame so as to enable frontal access to~~ the stage, and each brace is preferably disposed along ~~generally parallel to~~ a vertical optical axis of the microscope.

Please delete paragraph [00015.5].

Please replace paragraph [00039] with the following amended paragraph:

[00039] Microscopes have historically been constructed with C-shaped ~~C-shaped~~ frames with the objective and eye-piece ~~eye-piece~~ at the upper end of the frame and light source and stage at the lower end of the frame. The present inventor has determined that, while convenient to use and manufacture, conventional C-shaped ~~C-shaped~~ frames 77, shown in phantom in Figure 1, suffer from disadvantages in that these frames are susceptible to undesired vibrations, and in fact are shaped and surprisingly act much like tuning forks. It has been found that external vibrations from any source and of virtually any frequency tend to excite the tuning fork shape of the conventional C-shaped ~~C-shaped~~ frame to vibrate at its own resonant frequency and

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related harmonics, and this can distort the image resolved by the microscope. These disadvantages are particularly exacerbated with the present invention which otherwise can allow microscope 10 to resolve objects smaller than 250 nanometers, or less, and to detect objects as small as less than 50 nanometers. Accordingly, it is preferred to attenuate vibration of the microscope frame such that undesired movement of objective 40 relative to the sample 74 being imaged is inhibited.

Please replace paragraph [00074] with the following amended paragraph:

[00074] It is further contemplated that ultrafine focusing focussing of the microscope can be accomplished by controlled distortion of the vibration control braces 78 of microscope 10. For example, if a hydraulic cylinder 75, illustrated schematically in Figure 1, (not shown) is used to couple the braces 78 together, then adding fluid to the hydraulic cylinder will force the braces 78 apart and deflect objective 40 towards sample 74 very slightly, thus providing a very fine focus control. If a very fine screw (not shown) is used to drive a very small bore piston (not shown) into a cylinder (not shown) filled with hydraulic oil and the resulting pressurized oil is supplied to the hydraulic cylinder connecting braces 78, then a very ultrafine focus can be implemented. Such an adjustment screw can be under computer or external electrical control. The same type of function can be accomplished with a screw mechanism either in tension or compression between the braces 78 so that adjustment of the screw mechanism accomplishes the fine focus.

Please replace paragraph [00075] with the following amended paragraph:

[00075] It is also contemplated that microscope 10 can employ one or more piezoelectric struts located similarly to cylinder 75 (not shown) between braces 78 to accomplish the ultrafine focusing focussing of the microscope. Variation of the voltage on the piezoelectric struts will shift the focus of the microscope slightly. Alternatively, ~~the~~ struts each brace can be fabricated in two units and can include a piezoelectric layer sandwiched between the upper and lower halves of the braces, located as illustrated in

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Figure 3, so that the piezo element can vary its thickness and by so doing alter the length of the braces.

Please replace paragraph [00076] with the following amended paragraph:

[00076] Figure 3 shows such a configuration of two braces containing piezoelectric elements for active Z position control. The top portion of the body of the microscope 82 is connected to the top halves of each brace 202. The lower surface of brace 202 is adhered to an insulating and conductive top electrode 203, which allows the connection of the piezo to a voltage source. Electrode 203 is connected to piezo electric layer element 204 which is adhered to the bottom electrode 205. Electrode 205 is adhered to the bottom half of the brace 201. A voltage applied between electrodes 203 and 205 causes a change in dimension of piezo layer element 204 and moves the imaging means and related optics relative to the sample object 74. A further application of this piezoelectric system is to move the microscope Z adjustment in synchrony with a vibrating sample 74 to obtain images of samples undergoing or exhibiting fixed frequency vibrations which have apparently halted the motion of the sample, at least in the Z plane. Alternately a three axis piezo mount can be used to secure the objective to the microscope body. By driving this mount in synchronized three dimensional patterns it can be possible to freeze the motion of a sample object in rapid oscillation by matching the motion of the objective to the motion of the object.